

Charge Fluctuations on a Quantum dot coupled to a lead through a resonant impurity

Frithjof B B Anders¹, Eran Lebanon², Avraham Schiller²

¹ *Institut für Festkörperphysik, University of Technology Darmstadt, 64289 Darmstadt, Germany*

² *Racah Institute of Physics, The Hebrew University, Jerusalem 91904, Israel*

The charge fluctuations on a metallic grain coupled to a lead through a single resonant impurity level are investigated*. We generalize Matveev's mapping[†] of the charge fluctuations in the vicinity of a charge step onto the anisotropic two-channel Kondo model, and solve the resulting Hamiltonian for arbitrary coupling strengths using Wilson's numerical renormalization group. We calculate the effective capacitance C_{eff} as function of the temperature, the applied gate voltage, the position of the impurity level and an applied magnetic field. The dependence of the characteristic low-energy scale on the ratio of the tunneling matrix elements connecting the impurity to the grain and to the lead is obtained. The effect of an on-site Coulomb repulsion on the impurity level is discussed.

*Th. Gramespacher and K.A. Matveev, Phys. Rev. Lett. 85, 4582 (2000)

[†]K. A. Matveev, Phys. Rev B 52, 16676 (1995) and references therein